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ing to Fruit Growing
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Color Plates by
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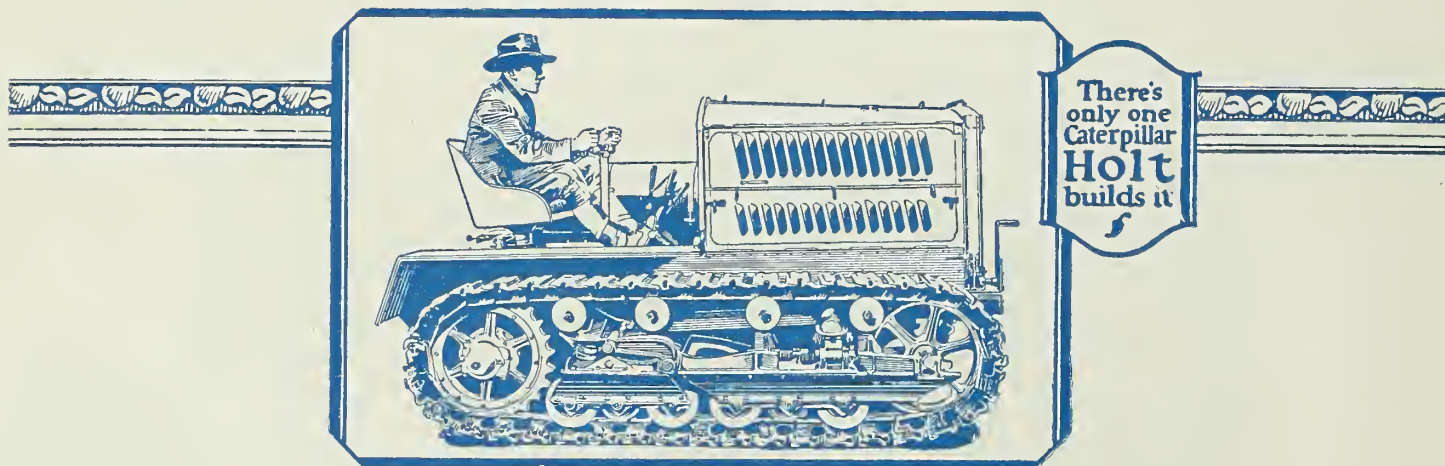
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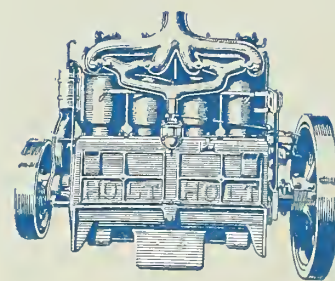
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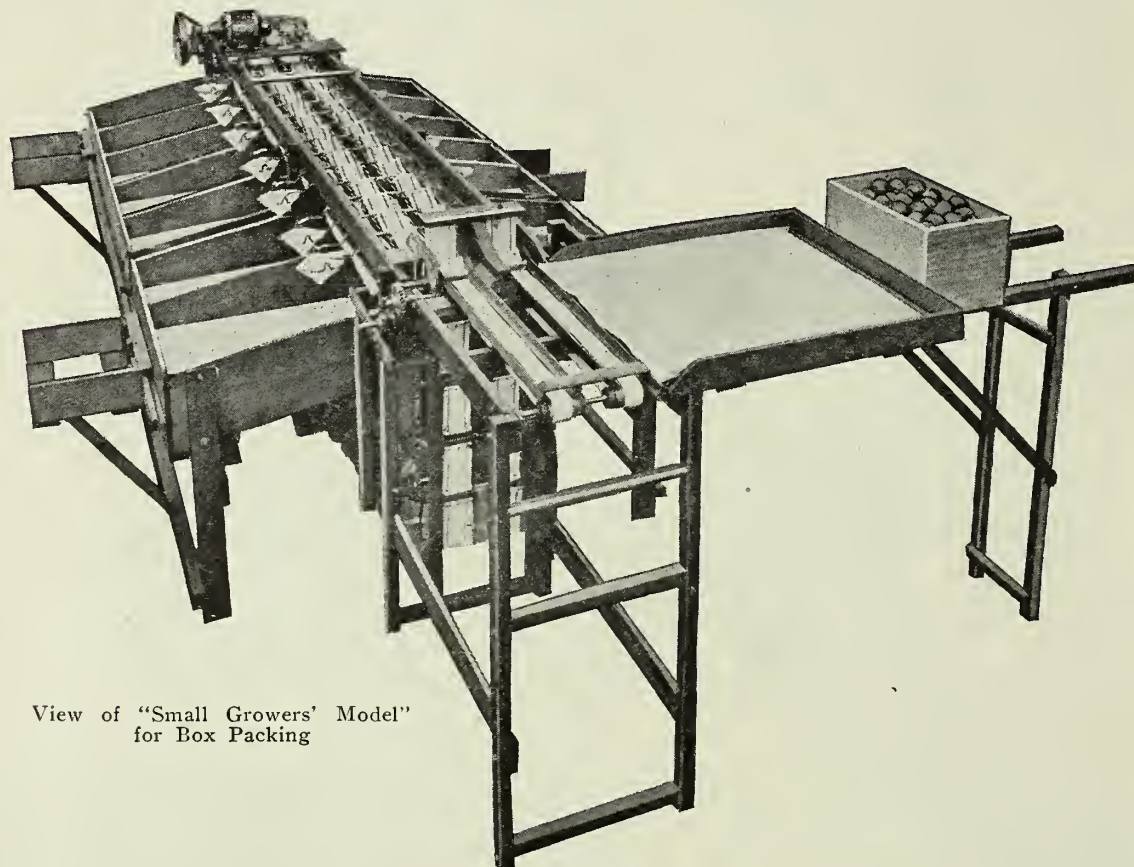
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Use of Dust Sprays in California

By W. L. Howard, Professor of Pomology, University of California. In Charge Deciduous Fruit Station, Mountain View, California

DUST sprays, used both as fungicides and insecticides, have been in general use in California for many years. Dry sulphur has always been the standard remedy against mildew in grapes, and since the vineyard business in California has always been one of our most important agricultural industries, enormous quantities of sulphur have been used in dusting the vines. In no other instance, however, has a dry spray proved of practical importance in California as a fungicide. There has never been any serious effort to use dry sprays against diseases of tree fruits, except possibly to employ dry sulphur against the mildew in apples, and this was always a failure. Wet sprays, it may then be said, are now almost exclusively employed for controlling diseases.

In striking contrast with disease control, splendid success has attended the use of dry sprays against certain insects. One of the first marked successes in this direction was the use of sulphur dust against red spider on almond, peach and prune trees. The dust is applied, usually by means of a hand dusting outfit, after the insects appear in midsummer. It is believed that the killing principle of the spray depends upon the slow volatilization of the sulphur under the heat of the sun, and that it is these slowly liberated fumes that kill the mites.

During the past year or two, another long step has been taken in the use of dust sprays by the discovery of a new insecticide which can be used as a dry spray. The new dusting material consists of a carrier made of kaolin clay, which easily reduces to an almost impalpable powder, to which is added specific quantities of nicotine sulphate (Black Leaf 40). This material, the original brand of which is known as nicodust, is now available in different strengths, namely two per cent, five per cent and ten per cent. This spraying material was designed by Prof. R. E. Smith, head of the Division of Plant Pathology of the College of Agriculture

of the University of California, as a remedy against leaf aphid of walnuts. It had never before been possible to control this insect on walnut trees, mainly for the reason that the trees were too large to be successfully sprayed with liquids. It often required hours to spray a single tree properly with a liquid, and then the results were

Prof. E. O. Essig has secured some splendid results during the present season in the control of the rosy apple aphid by dusting with what is known as the double nicodust, which contains 5.9 per cent of nicotine sulphate. This corresponds very closely to the so-called ten per cent nicodust of last year. The dust seems to penetrate the clumps of



Applying Nicodust in the Orchard

far from satisfactory. The job may now to be done with two per cent nicodust in a few minutes, and obtains a very satisfactory slaughter of the insects.

During the season of 1920 the Deciduous Fruit Station of the University of California found that a five per cent nicodust could be very successfully used in controlling thrips on prunes and pears, as well as on nursery stock. Owing to the fact that nicodust kills by the rather rapid liberation of the nicotine fumes, it is necessary to apply the material to the trees during the warm part of the day, under California conditions, as the nights and early mornings throughout the spring and most of the summer are apt to be very cool.

leaves that have been curled by the work of the aphid much better than liquid sprays, and the kill of the insects has been very gratifying. The same dust seems to penetrate the clumps of the mealy plum plant louse, with very promising results, even after the leaves have been badly curled.

Strange enough, the nicotine dust has not been a success against the red spider. This may possibly be due to the fact that the fumes are liberated too rapidly. Apparently after about three hours all of the nicotine vapors have become completely dissipated, whereas sulphur fumes are liberated more gradually and continue for days.

Arsenical sprays in dust form, as well as certain fungicidal sprays, are

now in general use in California, but all these are reduced to a liquid for spraying purposes. Dry arsenate of lead is now in almost universal use, and a dry form of lime-sulphur is rapidly supplanting the customary liquid lime-sulphur in the principal fruit districts. Dry Bordeaux, which is added to water, is now similarly being used by those who prefer Bordeaux to lime-sulphur or require it for certain purposes. The dry lime sulphur is mixed with water for spraying.

Beginning with the season of 1921, the Deciduous Fruit Station has been making extensive tests of dust sprays against brown rot. Judging from the results secured by peach growers on the Atlantic coast, first-class control by dusting is scarcely to be expected. However, if the apricot growers, for example, are prevented from spraying with liquids at the proper time on account of rains or wet soil, they would be content with a lower degree of control if this could be obtained by some other means, as by the use of a dust. The advantage of the dust will lie in the ability of the grower to get on the land with a lighter spraying outfit and be able to spray his trees much more quickly. Dusting outfits, as used against thrips in prune orchards for example, are able to cover from four to thirty-five or forty acres a day, depending upon whether a hand outfit or a gasoline power outfit is used.

Arsenate of lead as a dust has never been used, except in a very small way against such insects as the codling moth, and where it was employed it was not an unqualified success. The future development of dry sprays as insecticides seems to lie in the direction of those that give off fumes rather than in the use of arsenicals. What the future holds for dust as fungicides is problematical. Probably they will always be of only secondary value for the purpose, but even so they would have a place in the fruit grower's program and might be expected to be highly valued under the special conditions under which they are employed.

Dusting Costs

IN FIGURING the relative cost of dusting and spraying, Prof. H. H. Whetzel, plant pathologist of Cornell University, says that the time and labor saved in dusting may more than offset the relatively high cost of dusting material and that, if the factor of valuable time saved for other work be added dusting will have to be regarded as much the cheaper orchard practice.

"Why have fruit growers everywhere looked with such hope and favor upon this new method of applying fungicides

and insecticides?" asks Prof. Whetzel in a paper presented before the New York State Horticultural Society. "Not primarily because you have seen in it a more effective means of controlling diseases and insect pests, but because you have discerned in it at once certain efficiencies and advantages over the application of fungicides and insecticides in liquid form.

"No intelligent and practical grower or expert would argue as yet that dry materials as such are more effective than liquid sprays. That their successful application in dry forms assures certain distinct advantages of decided economic value everyone has appreciated and acknowledged from the beginning; greater rapidity of operation and consequent saving of valuable time and expensive labor; more timely application and thereby more uniformly effective control; elimination of the undesirable waterhaul and its attendant difficulties, all these have been acknowledged without question or debate."

In a questionnaire sent out by Prof. Whetzel, the following results were shown:

"Did you dust your apples this past season? Yes 73.

"Did dusting control scab as well or better than spraying? Yes 49, No. 9. (Three were in doubt, twelve did not answer.)

"Did dusting control codling moth as well or better than spraying? Yes 51, No 6. (Two were in doubt, 14 did not answer.)

"Will you dust apples next season? Yes 68, No. 4. (One is in doubt.)

"Evidently apple dusting still looks good to about 95 per cent of the duster owners in this state.

"Recently I visited the Annapolis Valley, the great apple growing section of Nova Scotia. Picking of Gravensteins and some other early varieties was just beginning so that I had an excellent opportunity to see the fruit on the trees in its finished conditions. I visited many of the commercial orchards throughout the valley. Some 50 dusters were in use in this region. Every dusted orchard visited showed practically as good or better control of scab and insects than did the sprayed orchards. In a season said to have been the worst scab year since 1913 with unsprayed Gravensteins running approximately 100 per cent scabby, actual counts made by Professor Sanders in the orchard of C. M. Roscoe, dusted but three times, showed 91 per cent absolutely scab free fruits as against 97.5 per cent scabby on undusted check trees of the same variety in the same orchard. I found every dust user I met not only satisfied but enthusiastic over dusting. It was the consensus of opinion among

growers, investigators and fruit inspectors with whom I talked that dusting would very rapidly replace spraying throughout the valley.

"Considering the question then of the efficiency of dusting for scab and worm control on apples, on the basis of, first, experimental evidence and second, the opinion of the growers who dusted the past season, one is forced to the conclusion that dusting wins.

"In spite of the fact that the evidence at hand clearly proves dusting to be quite as effective as spraying for the control of scab and worms, I am well aware that its general adoption as a substitute for spraying largely depends upon the solution of certain accessory problems. The most important of these is an effective contact dust, a dust that will kill sucking insects like the aphid, red bug, psylla and the like. The problem clearly lies within the entomological field but it cannot be divorced from the problem of scab control."

Refrigerator Ships

APPLE growers of Oregon and Washington will be asked to cooperate with the citrus growers of California in utilizing the Panama canal and the new refrigerator ships now being developed for shipments direct to Europe through the canal. Shipping agents are arranging for many thousands of carloads of citrus fruits and northwestern apples to be handled in this manner.

The steamer *Charles H. Cramp* has been converted into a floating laboratory, plying between the Pacific Coast and the eastern seaboard through the canal, to determine the best conditions for the handling of citrus fruits and apples. Cargo space has been divided into compartments in which different conditions can be produced and controlled. In the tests it will be made possible to make records under variable transit conditions. Factors to be studied include the temperature, ventilation and humidity both individually and in combination.

On the first shipment of northwestern apples a 40 degree refrigeration will be experimented with. This test may be made in June.

IT IS not realized generally that farmers and fruit-growers own and operate fully fifty per cent of the automobiles and trucks in this country, the total of which now exceeds 9,000,000. They wore out half at least of the 24,000,000 tires used last year and will buy their share of the 27,000,000 tires required this year to keep the cars running.

Tractors In Demand For Orchard Work

By J. W. Ray

FROM the peach orchards of New Jersey, the apple orchards of Oregon, the citrus groves of Florida, the cherry orchards of Wisconsin, the pear and prune orchards of Washington, and the walnut groves of California comes indisputable evidence of the fact that tractors are replacing horses in or-

that the tractor increased the crop on fourteen acres to the extent of \$5000 in one year, because of the deeper cultivation permitted.

2. Horses are too slow to get the work done at the proper time.

The speed of the tractor, coupled with its ability to draw large implements,

ments close enough to the trunks of the trees to do most of the work formerly done by hand.

4. Horses cause considerable damage to trees, both by brushing against limbs, and by scraping the traces and single-trees against the trunks of the trees.

Tractors, if of the proper type, get in under the low hanging limbs without injury to the fruit spurs, and, because of their narrowness, can put the implements close to the trunks without danger of themselves coming in contact with the tree.

5. Horses require feed the year 'round. Since orchard culture requires power only about five or six months of the year in most sections, there is a long idle period during which horses produce nothing, yet have to be fed and cared for. Commercial orchardists grow very little horse feed. Grain must be bought. This makes expenses high.

The tractor is, of course, free from this objection. When not in use it can be stored away in a small shed and forgotten.

6. Horses suffer greatly from the heat when working at cultivation during the summer months. This is particularly true in level orchards where the trees are of bearing age.

An Illinois apple grower claims that his tractor paid for itself the first year because it made possible cultivation during the hot month of July.

7. Horses have severe limitations when it comes to operating the spraying outfit.



The Small Crawler Tractor, Because of its Compactness and its Smooth Exterior, Handles Implements Right Up to the Bases of the Trees.

chard work. In fact there is no other class of farming in which the tractor is so nearly universally used or in which it so completely displaces horses.

The reasons for this can be most clearly understood by pointing out in some detail the advantages of the tractor over horses, as outlined in reports from tractor salesmen in these different sections, and in letters from practical orchardists throughout the country.

1. Horses are not powerful enough to draw implements suited to the best orchard culture. If more horses are used the outfit becomes unwieldy and impossible to handle around trees.

The ample power provided by the tractor permits a much better quality of cultivation. Better plowing is done, particularly where there is a heavy growth of cover crop to turn under, or where it is desired to plow close up to the base of the trees. Disc harrows can be weighted and set to secure the depth and pulverization demanded for good work, particularly where it is desired to disc under a cover crop instead of plowing it. Spring tooth harrows may be set deep to tear up the soil. Subsoilers can be used to break up the hard pan formed by the plow sole.

A California walnut grower claims

remedies this very vital factor. Often-times this makes cultivation possible where otherwise it could not be done at all, and makes the difference between a good crop and a very poor one. Getting spring cultivation done early and quickly is a big item in the citrus groves of California.



Comparatively Inexpensive Wheel-Type Tractor Is Popular Among Small Orchardists and Berry Growers.

3. Horses are large and teams are unwieldy around trees.

The tractor, especially one of the small crawler type, is much more easily handled around, under and close to the trees, making it possible to get imple-

Tractors make possible the spraying of hundreds of additional trees every day. This is because a larger sprayer may be drawn, and because more speed can be made in traveling to and from the

(Continued on page 16)

Relation Of Bee Keeping To Fruit Growing

By Dr. A. L. Melander, Entomologist, State College of Washington

THIS paper will deal with two aspects of the problem suggested by the title: first, the necessity of having bees in the orchard if the trees are to produce their maximum fruit yields; second, the necessity of changing spraying methods if bee keepers are to remain in the orchard districts.

Bees have long been known to be of value in pollinating plants, but, just how far fruit trees are dependent on bees is not so thoroughly known to the general fruit grower. A number of carefully conducted experiments have been recorded in various bulletins and reports from which the following citations have been gleaned.

Different varieties of fruit are either self-sterile, partially self-fertile or else entirely self-fertile. In the first instance, bees or other agencies for the transfer of the pollen grain are an absolute essential if the fruit is to set at all. In the second instance, where flowers are only partially self-fertile, a full crop of fruit would not result if all insects or other agencies for the transfer of the pollen were eliminated. In the third instance, of complete self-fertility, there are abundant records to show that crossing produces better fruit. *Hence, in every case the fruit grower will profit by having bees in his orchard. In no case are bees detrimental.*

Among the varieties of apples that are known to be self-sterile are the Arkansas Black, Gravenstein, Gano, Jonathan, King, Mammoth Black Twig, Missouri Pippin, Rome Beauty, Rhode Island Greening, Transcendent Crab, Wealthy, Winesap, Yellow Bellflower and York Imperial.

Among those only partially self-fertile are included the Ben Davis, Spitzenburg, Wagner and Yellow Transparent.

Among those that are self-fertile are the Baldwin, Grimes Golden, Dutchess of Oldenburg and Yellow Newtown.

Experiments conducted by the Oregon Experiment Station have shown that while the Spitzenburg is regarded as partially self-fertile, it produces only three per cent of fruit when self-pollinated, but when receiving pollen from the Arkansas Black it will set 70 per cent of its fruit. Similarly pollen from the Ortleigh, Jonathan, Baldwin or Red Cheek Pippin produces a heavy set on Spitzenburg while pollen from the Yellow Newtown produces only about 40 per cent set. Such experiments are the result of hand pollination, but are indicative of what would happen when bees visit from flower to flower.

Other varieties of fruit show a similar variation as to fertility.

Most pears require cross pollination since they are only partially, if at all, capable of setting fruit when self-fertilized. The California Experiment Station has demonstrated that plums and prunes will present a vastly heavier crop when cross-pollinated, both being more or less self-sterile.

Of the cherries, the Royal Ann, Bing, Black Tartarian, Lambert and Black Republican are self-sterile. Thirteen varieties of almonds experimented with at the California Experiment Station were wholly self-sterile. Peaches have also been demonstrated to be almost entirely dependent on the visits of bees if a good crop is to ensue.

Of the smaller fruits, raspberries, blackberries, strawberries, cranberries, etc., are all abundantly visited by bees and the amount of fruit that would set is entirely proportional to the number of visits.

THE question of the distribution of pollen by wind has been settled at the Oregon Experiment Station by fastening slips of vaselined glass in and near apple trees. So few pollen grains were caught on the sticky glass as to prove conclusively that wind is not at all an agency in carrying across apple pollen grains from one flower to another.

It has been proved that if blossoms do not receive pollen grains they fail to set. This is the main explanation for the familiar "June drop."

It requires one pollen grain for each seed, five pollen grains must therefore, fall upon and enter each apple flower, while the strawberry or raspberry would require many more grains.

When a pollen grain falls on the sticky stigma, the female part of the flower, it starts to grow down a tube carrying the sperm cells into the innermost parts of the blossom. The union of a sperm cell with an egg cell starts the growth of the seed. Unless all seeds are started, the fruit becomes misshapen in its growth, if it does not drop entirely from the tree. Hence a complete pollination with healthy viable pollen is the first requisite in the setting of a fruit crop. As shown some varieties of pollen seem to be better adapted than others in insuring a complete fertilization. Even in case of self-fertile varieties, pollen from other blossoms or better from other trees, or perhaps better still from other varieties, is needed for best results.

It is interesting to note that contrary to popular opinion pollen grains do not affect the color of the apple. A Spitzenburg pollinated by an Arkansas Black is no darker than if pollinated by a Yellow Newtown, but many more apples would set from the Arkansas Black pollen than if the pollen were obtained from a Yellow Newtown tree. The former pollen is more effective, more likely to start the complete production of seeds, hence the result is larger and better formed apples even though the color is not affected.

Many millions of years ago the first flowers came into existence and also the first bees. Since that time, these two developments of nature have worked up an inter-dependence so that the modifications of flowers as we now know them have been developed through the agency of bees. In a corresponding way the bees have become modified in their body parts, as an adaptation to floral structure.

FLOWERS develop showy petals to attract the bees. Nectar is produced at the bottom of the floral parts to force the bee to dip down as far as possible in securing it. Pollen is produced in over-abundance as a delicious food for the bees. Bees in their turn have developed a long tongue for lapping up the nectar, a crop for storing it for the flight home, a body covered with remarkable pronged hairs for collecting the pollen and adaptations on the legs, the pollen baskets, for scraping together and transporting the pollen load.

In the visits to flowers, bees come in contact with the pollen—the little grains covering their body are then rubbed on the sticky stigma often as a result of a remarkable arrangement in the formation of the flower parts. After pollination, the stickiness of the stigma dries up so that the flower is receptive only for a few days, usually at the beginning of the blossoming period. As a further result of pollination, the nectar ceases to be produced and the petals drop quickly. The flower is no longer attractive to bees.

Some trees have a tendency to over-set fruit, requiring costly thinning in commercial orchard practice, might be rendered less prolific if bees are withheld or if sprayed with some corrosive spray that would destroy the stigmatic surface. The only drawback to such a recommendation is that if carried out one would not be sure of a setting of fruit at all. Most fruit men would prefer to thin a super-abundance of fruit

than to run the risk of getting no setting.

At the beginning of the fruit blossom season an orchard should be humming with bees. In fact, by actual observation in normal orchards the honey-bee has been found to outnumber all other visitors of flowers a hundred to one. Other insects may be present, as for example, a few bumblebees, some wild bees-, a few butterflies and several species of flies, but all of these combined would have little effect in cross-pollination if the honey-bee were excluded.

Where actual tests have been made where either branches or whole trees have been inclosed in netting so as to exclude bees, it has repeatedly been found that the fruit crop suffers. Many practical orchard men hire bees for the blossoming period, the usual price to bee keepers being \$5 per colony. Keeping a small apiary in the orchard will bring returns many times greater than the cost of the colonies. Everyone has noticed how fruiting has been interfered with by bad weather at blossoming time. When bees are not flying, the trees hold out the inducement of their blossoms a longer time, but if cross-pollination is not forthcoming a heavy June drop may be expected. This is an important factor in growing prunes, berries and other fruit, especially in western Washington.

In this mutual arrangement of give and take the fact must not be lost sight of that it is the fruit grower who profits most. The bees insure a crop of fruit. Due to their activity the crop is increased, perhaps by ten per cent, perhaps doubled. In return during the day or two that each flower is visited they get some pollen and nectar, not enough to build up stores, but only enough to stimulate brood rearing.

Freight Rates Must be Lowered

By THE EDITOR

INCREASED freight rates have precipitated a crisis in the affairs of fruit growers of the Northwest states which, unless early relief is granted, will result in smaller production and in many cases in ruin to the growers and corresponding loss of income to the railroads. This is the situation as presented to Henry J. Ford, interstate commerce commission examiner, by witnesses at the hearing held in Yakima last month.

Unless relief is forthcoming for this serious condition, growers must pin

their hopes to the development of water transportation, concerning which a meeting will be held at Seattle June 1. Apple exporters at that time plan to organize a corporation to handle all fruit shipped abroad and to the Atlantic seaboard. It is hoped to obtain pledges of 10,000 carloads of perishable products from the Pacific coast for water transportation.

At the Yakima hearing, J. Curtis Robinson, traffic manager of the Northwest Fruit Exchange, testified

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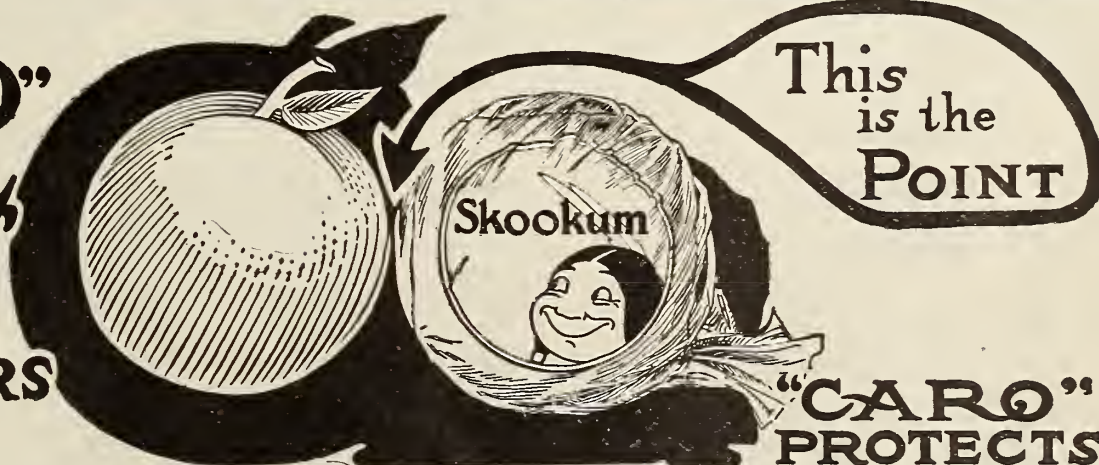
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that if present freight rates had been applied at any time from 1912 to 1920, growers of fruit receiving highest average prices during those years would have lost an average of 33 cents a box on apples.

A. W. Stone, general manager of the Hood River Apple Growers' association, declared that if Hood River orchardists had their land and all equipment donated without cost with no depreciation, interest charges, nor taxes, their total costs would have been \$1.35 a box during the last year and their average net return of \$1.23 a box would have brought a loss of 12 cents a box.

F. A. Duncan, vice-president of the Yakima National Bank, which places 50 to 55 per cent of its loans directly or indirectly on fruit in normal times, said that the bank finds itself unable to make further loans in the face of the present losing situation of the fruit growers.

Hundreds of cars of potatoes have been fed to the hogs in Montana reported H. M. Louis, manager of the Northwest Potato Growers' Association.

H. M. Adams, vice-president of the Union Pacific System, appeared as spokesman for the carriers, introducing figures to disprove contentions of the fruit men, but declaring that if the roads could reduce labor and operating costs they would voluntarily reduce freight rates.

H. F. Davidson of Hood River was chosen to be chairman of the organization committee to arrange for formation of an export corporation at Seattle. Others on the committee are: R. W. Kelly, Hood River; B. A. Perham, Yakima; W. F. Gwyn, J. C. Porter and J. MacPhee Ferguson.

The meeting at Yakima decided that the export organization should work through established channels. Firms represented were the H. F. Davidson company and Kelly Brothers, Hood

River; Oregon Growers' Co-operative association, Salem; Wells & Wade, Wenatchee; Earl Fruit company, Spokane; Northwestern Fruit Exchange, Seattle; Thompson Fruit company, Richey & Gilbert, J. M. Perry & Company, Perham Fruit company, Yakima Fruit Growers' association and J. MacPhee Ferguson, Yakima.

Gopher Poison

A STRYCHNINE poison devoid of bitter taste may be obtained from county agricultural agents in Oregon at cost for use in eradicating the gopher. In using this poison the roots should

be peeled and cut in $\frac{1}{2}$ inch cubes. Six quarts of these cubes are treated by sprinkling one ounce of strychnine over them, stirring thoroughly to insure an even distribution of the poison.

Care should be exercised in exposing the baits. The main runway being located by the use of a prod about $\frac{3}{4}$ inch in diameter and through the hole made by this probe two or three of the poisoned cubes should be dropped into the main run and the prod hole closed with the aid of a firm clod. Caution should be exercised not to place the bait in the short lateral runway leading from the mound of earth to the main run.



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In the orchard, where insect pests infest the tops of the trees, a powerful sprayer is always necessary.

The American Beauty Dust Sprayer was designed to meet this very need. Its powerful blast forces dry insecticides to all parts of the tree, penetrating the center of every leaf and blossom cluster, thereby giving greatest protection.

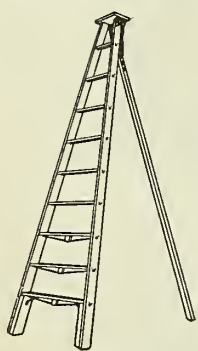
In the control of Aphis, Thrips, Mildew, Red Spider and other pests "Calispray" dusts and the American Beauty Dust Sprayer are unequalled for economy and efficiency. The machine is operated by one man and places the dust only where needed and in its most efficient form. In orchard work 15 acres a day may be covered, with larger acreages in field or vineyard.

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actually *less costly on the house or barn* than cheap paint. Don't allow surfaces to rot. It costs less to paint them.

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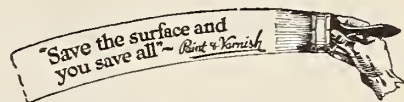
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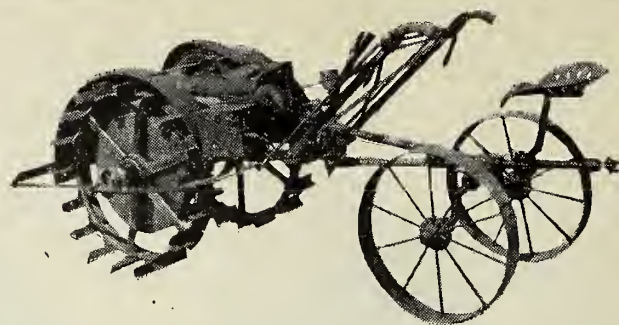
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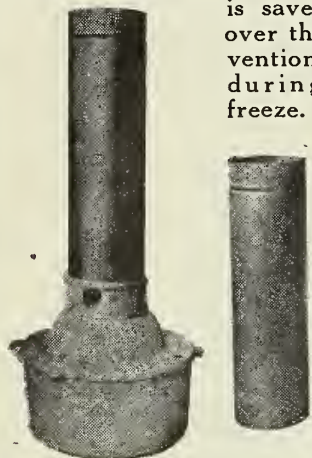


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GMC on a Truck Is Like U. S. A. on a Bond

Do Not Over-Spray Fruit

THE Washington State Insecticide and Fungicide board, in recent session at Pullman gives the following timely warning to fruit growers with reference to the over-spraying of apples and pears with arsenical materials:

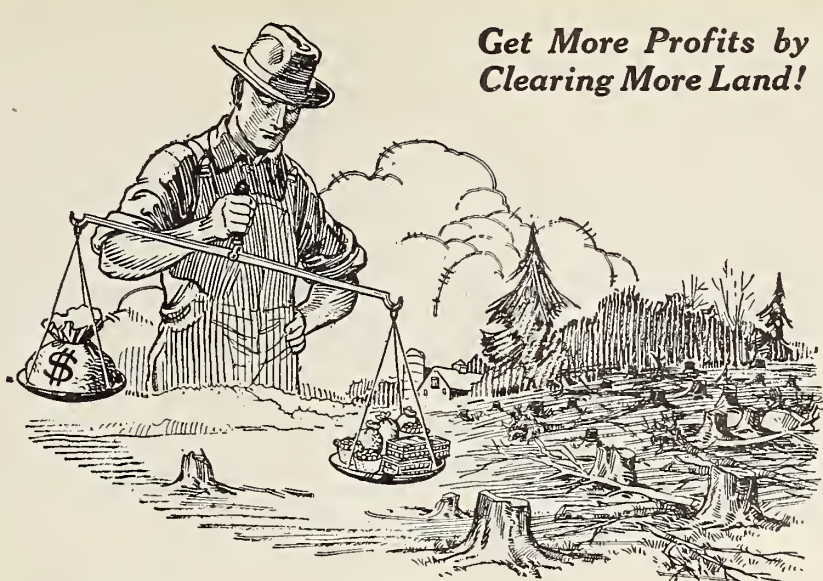
"During the past few years there has been some agitation about the presence of arsenicals on western fruit and in a number of cases shipments have been condemned. Spraying with arsenate of lead or some other arsenical is judged necessary for the control of codling moth, and with judicious application fruit is never so coated as to become actually detrimental to health. But the heavy application of arsenical spray, the custom of frequent and particularly of late spraying, and the tendency of over-doing the spraying, have resulted in so much spray material adhering to the surface of the fruit, especially in the rainless districts where most of the commercial western fruit is grown, that many shipments have been condemned.

"Quite obviously, over-spraying is wrong and should be discouraged. It is wasteful of material; no additional benefits accrue from doubling the strength of the spray, or spraying oftener than the generally accepted spraying program calls for, or for continuing the application until the trees are drenched and dripping. Over-spraying causes a blotching of the fruit, irregularly coloring and a deposit of arsenic that wiping cannot eradicate. It is responsible for the poisoning of bees from the drip on the cover crop. It is giving orchard grown hay the reputation of being unfit for feed.

"Spraying practices for codling moth have been fairly well worked out and should be generally understood. Adequate spraying of fruit for this insect pest calls for at least four or five applications. The arsenate of lead need not be used stronger than three pounds at the most to every 200 gallons of spray. When the tree is best covered it has not begun to drip. Especial emphasis on the first brood of worms, particularly through the calyx spray, should make the later applications less essential. The use of a spreader with the arsenical such as sodium caseinate, increases the covering power of the spray and renders less material necessary. High pressure pumps better the application by forcing the spray against the skin of the fruit in the case of fan-spray nozzles, or by breaking up the spray into finer particles in the case of the spray guns.


"Bearing in mind and applying the principles underlying codling moth treatments should make it unnecessary for the west to become alarmed over

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poisoning its fruit so as to make it unhealthful. Its reputation for clean, carefully graded fruit has been built up on its methods of conscientious spraying. The public spirited orchardist should keep watch over his over-zealous neighbors as well as over his neglectful ones and impress on them both alike the necessity of safeguarding the reputation of western fruit."

The board comprises the following individuals: E. L. French, Director of Agriculture, ex officio; C. L. Robinson, Supervisor of Horticulture, chairman;

E. C. Johnson, Director of Experiment Station, vice-chairman; Dr. A. L. Felandier, Entomologist, secretary; Dr. F. D. Heald, Plant Pathologist; George A. Olson, State Chemist.

The volume of fruit crop in the region traversed by the Denver & Rio Grande will be equal to, if not greater than, that of last season, reports W. H. Olin, the railroad supervisor of agriculture. In 1920 the territory produced 5093 cars, apples and peaches predominating.

Experiments In Cherry Breeding

By C. E. Schuster, Assistant Professor of Pomology, Oregon Agricultural College Experiment Station

PREVIOUS work by this station has established the fact that the Bing, Lambert, and Napoleon (Royal Ann) cherries are both self-sterile and intersterile varieties. These varieties cannot be expected to bear much fruit when self-pollinated; neither will they bear fruit when pollinated by either one of the other two varieties. Where these varieties have been planted singly or in combinations, the crops have been very small or nothing at all. Many reports are being constantly received that cherry trees ten, twelve and fourteen years old blossom profusely each year, but produce no fruit. Investigation of this condition generally shows that the trees belong to the Bing, Lambert or Napoleon variety and are receiving no pollen from any other varieties.

While these three above mentioned varieties are inter-sterile with one another, they respond readily to cross-pollination from several other varieties like the Black Republican, Black Tartarian, or the Waterhouse. The first two varieties mentioned being unsuitable for canning are not in general favor except for home use. The Waterhouse more nearly approaches the Napoleon in size, color and solidity; it is more satisfactory to the canners as it brings a better price to the canning trade than any of the other varieties used for pollination. Two types of Waterhouse are in cultivation, the long-stemmed and the short-stemmed of which the long stemmed is the more desirable.

If one were to go back to the early history of horticulture in Oregon, he would find that the Napoleon was often propagated by means of seed. Many of these seedlings were inferior, while others were almost identical with the parent and worthy of being kept as orchard trees. They were sometimes known as Napoleon or Royal Ann Seedlings; at other times simply as Napoleon or Royal Ann trees, and were often propagated by owners and set out

in orchards. From these orchards they were scattered by propagation in the nurseries over the state and as a result we often have a Napoleon type rather than a strictly Napoleon variety. Many of these are more or less inter-fertile with the Napoleon, Bing and Lambert varieties. This will undoubtedly explain the reason for the partial crop of Napoleons in many of the commercial orchards where they have planted the Napoleon, Bing and Lambert varieties in solid blocks.

Besides the problems of sterility, there comes up the question of susceptibility to disease. All of the sweet cherries are at times severely attacked by bacterial gummosis. On account of these problems breeding work with cherries was started. Seed, resulting from crosses on these varieties by several other varieties, was planted in an endeavor to reproduce a new heavy yielding variety of high quality, free from gummosis, self-fertile and inter-fertile with the Bing, Lambert and Napoleon. A number of seedlings were obtained, some of which have been bearing for three or four years.

In the spring of 1920, eighteen of the more promising of these seedlings were placed under test for self-sterility. Over 3300 blossoms were bagged and allowed to self-pollinate. From these blossoms a number of fruits developed to one-third or one-half size and then shriveled up and dropped off, but not one developed to maturity, indicating a condition of self-sterility for all of these seedlings.

On the trees where tests were being carried on, good crops of cherries were produced as a result of insect pollination. Due to the fact that there were many other seedlings blossoming in this lot, it is impossible to tell whether these eighteen promising seedlings were inter-fertile among themselves or were pollinated by the surrounding inferior trees. The question therefore of inter-fertility or inter-sterility between these trees re-

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mains to be determined by further tests.

Resistance to gummosis is variable. Several of the better seedlings have records showing almost complete freedom from the disease, while others are very susceptible.

The surprising feature of the experiment has been the relatively large number of trees that have produced fruit of medium or excellent quality. Only those of excellent quality have been retained. One of those kept for further tests bears fruit as large as that of the Bing variety, but ripens at the same time as the Black Tartarian. Another one of the Napoleon type, but larger than the Napoleon, ripens from a week to ten days ahead of the Napoleon. The last one to ripen is just taking color when the Lambert is ready to pick. Canning tests by the horticultural products section have demonstrated the adaptability of several varieties for the canning trade.

With all of the seedlings the question of inter-sterility or inter-fertility and the annual production of fruit per tree remains to be tested out. Unless a seedling, after being carried through all the tests, is unquestionably of much greater value than any other variety now in cultivation, it will be discarded.

Cross Pollination

By A. F. Gillette, Oregon Agricultural College

CROSS pollination of bartlett pears is proving to be of great benefit to pear growers in California to increase the set of fruit and to decrease the amount of June drop.

A series of experiments carried on at Davis, Grass Valley and Vaca Valley, by the department of horticulture of the University of California, show that cross pollination is beneficial in every case, although soil, altitude and climatic conditions seem to bear some relation to the amount of fruit setting.

The Bartlett pears in some of the valley districts seem to be self fertile, but in all cases where they are cross pollinated with some other good commercial variety they have a larger per cent of fruit set and lose a smaller proportion due to June drop, besides producing a better quality of fruit in most cases.

Due to its long blossoming season in California—March 15 to April 20—and to the inter-fertility of all pear varieties with it, Bartletts can be crossed with most any variety except a few early bloomers as Anjou and Kieffer. The best results were obtained with the Winter Nelis and Comice.

In setting out a Bartlett pear orchard, especially in California, one should consider the point of planting intersets of good cross pollinators.



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Free Tolls

Howls of protest from newspapers in Mississippi valley states against proposed free tolls for American ships passing through the Panama canal ring insincere to the western ear. Either they are the evidence of a dog-in-the-manger attitude or they show the influence of transcontinental railroads on editorial policies.

The attitude is short-sighted, for the middle west will benefit almost as much as the Atlantic seaboard by the inauguration of free tolls. Unless shipping lines are able to compete on a parity basis with transcontinental railroad lines, freight rates to the east will remain as high as the traffic will bear. That appears to be elemental.

There is much that is unadulterated buncombe in the protest that free tolls would be unfair discrimination against foreign shippers.

The United States footed the bill for the construction of the Panama canal, and continues to finance its maintenance. Why should not the United States have the "edge" on foreign trade in the use of its own canal?

The west is vitally interested in the success of the free tolls program. Establishment of real competition between rail and water routes will hasten the return of normalcy.

Encouraging Signs

On the heels of the announcement of a reduction in the price of steel made by the United States Steel Corporation comes notice of 10 per cent cuts in the prices of farming and orchard implements by some of the largest manufacturers in the country. Reduction in published prices for 1921 of 10 per cent on all machines and implements, with the exception of motor trucks, manufactured by the International Harvester Company of America and a similar cut in implements fabricated by Deere & Co., of Moline, Ill., are the first to come to our attention.

It is a healthy sign. It is another step along the road to normalcy.

The interest of the manufacturer as well as the consumer is served in bringing buying back to a basis approaching the normal. Trade cannot be stimulated until confidence is restored and the buyer is convinced that no attempt is being made to gouge him. Stability is slow in following an era of inflation, but the present industrial outlook makes its early arrival appear certain.

In announcing its reductions, one manufacturer naively remarks that it means a "tremendous loss" to the company, but a loss it is willing to assume "in the hope that it will benefit the farmer or fruit grower in enabling him to buy more economically the implements he needs and at the same time increase the market for his products by giving employment to factory workers."

The average producer nourishes the idea that the "tremendous loss" is chiefly in anticipated profits. However, it certainly is a movement in the right direction.

There is no question that the reduction in the price of steel has no direct bearing on the manufacturing cost of implements being sold this year, as the raw materials already have been purchased at the higher prices. There is established, however, a lower replacement cost which rightly serves as a basis of a price to which purchasers are entitled and manufacturers should be willing to accept.

The attitude of these manufacturers is to be commended and it is to be hoped that buying will be stimulated.

Roses

In no section of the world are more handsome roses grown than the Pacific Northwest. Is there any logical reason why the fruit grower should not devote a portion of his few leisure moments to the culture of roses?

One need not be of esthetic temperament to enjoy things of beauty. A few hours spent about the orchard home in the planting of rose bushes, flowering shrubs and vines are not wasted. The little wife will appreciate these things far more than the man, whose thoughts are centered on the practical efforts in the field. Yet they brighten the home and make it a more pleasant place in which to live.

Flowers mean much in a woman's life. A little pampering of that love of the beautiful by the man of the house will make things much more enjoyable for her. A garden in which she may putter while her husband is guiding a spray hose among the trees provides healthful exercise as well. Not that she does not find enough work about her home, but this is pleasant work which borders on recreation.

Valuation of the beautiful in nature is a lesson which California orchardists may teach those of the Northwest. Orchard homes are often bowers of flowering beauty in that state. Many there are in the Northwest, but they are not so plentiful.

True, the blossoming of apple, cherry and other fruit trees provides a sight for the gods in the orchards of this country, but this spasm of coloring is but ephemeral. Give a little attention to flowers. It will be appreciated.

Farm Loan Bonds

To finance the federal farm loans a heavy issue of bonds has been placed on the American market. Fruit growers who are financially able will find little better investment. Not only will purchase of the bonds be profitable to them, but it will stimulate the farming industry generally by providing operating funds.

The federal farm loan bonds are non-assessable and free from income tax. They pay interest of five per cent and are issued in \$100, \$500, \$1,000 and \$5,000 denominations.

Nursery Law in Effect

IN accordance with a law adopted by the Oregon legislature last winter and effective May 25, nurserymen, their agents or solicitors must secure a license from the state board of horticulture before operating in the state. The law further requires that all nurserymen operating in the state furnish bond of \$1,000 to insure guaranties of reliability of stock. The law carries a penalty of \$50 fine or 30 days in jail.

More Broccoli Acreage

PRESENT indications are that there will be 475 additional acres planted in broccoli in the Willamette valley during the summer. Many growers last year cleared about \$300 an acre.

The usual practice is to sow broccoli seeds in a row from 18 to 24 inches apart and distribute the seeds thinly in the row, not less than an inch apart. The plants require from seven to eight weeks to make their seed bed growth. They will be ready to set out the last week of June or the first week of July.

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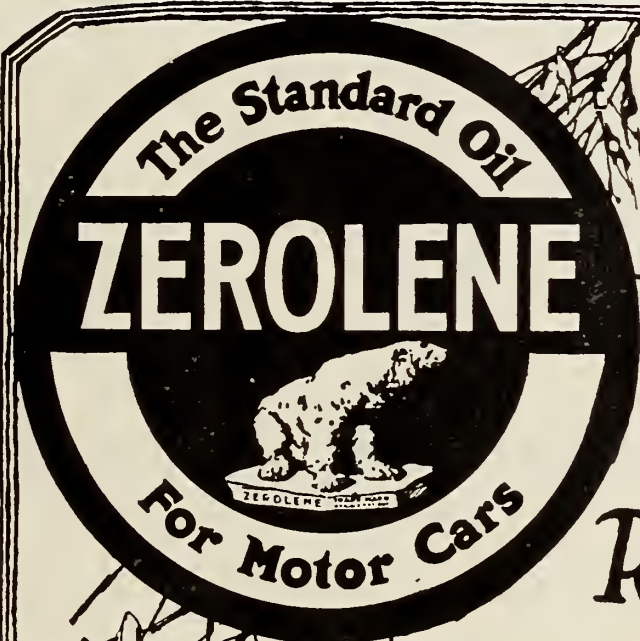
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STANDARD OIL COMPANY
(California)

Tractors in Orchard Work

(Continued from page 5)

filling station. Also, the steadiness of the tractor while spraying is being done from the spraying tower permits greater safety, comfort and efficiency for the operator.

An apple grower in southeastern Iowa claims that the tractor makes it possible to easily apply the first spring spray (bud spray) when the ground is often so soft that horses mire down or cannot pull the sprayer at all.

A Wisconsin cherry grower states that the tractor saved his orchard from destruction, by making it possible to control the "slot-hole fungus through more timely spraying and cultivation.

8. Tractors can operate on rough, hilly land so often found in orchards, where horses frequently find great difficulty in pulling any load.

A cherry orchardist near Sturgeon Bay bought a tractor when he was shown that it would make it possible for him to cultivate some of the ravines in his orchard which he had formerly left in sod.

9. Because of the lightness of the tread and the absence of and tendency to cut into the soil, crawler tractors can cultivate throughout the dry season in the Florida citrus groves without damaging the "water roots" which grow near the surface of the ground and are so essential to plant growth at this season.

10. In vineyards frequent and thorough cultivation, and timeliness in spraying are the factors of utmost importance. Only tractors insure success here. It is because the wine grape growers of France recognize this fact that they are making all their new plantings with sufficient width between the rows to admit the small tractor. A certain small tractor made in America and used in the war is being used quite widely, and is the standard gauge in determining the width of rows in new plantings.

11. In the cranberry marshes of New Jersey tractors have proved to be a great boon, because they make it easy to clear the land, and also make it possible to cultivate the marshes. Only crawlers can be used in this work.

12. The tractor furnishes belt power often needed in the orchard, such as for pumping water, running the cider mill, operating the fruit grader outfit, etc. Recent experiments have shown the practicability of using the tractor belt power for operating the pump of the spraying outfit while the sprayer is being drawn by the tractor. This eliminates the need for an extra motor for the pump. There seems to be a widespread demand for an outfit of this kind.



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For all of these reasons tractors are coming to be the standard power unit in commercial orcharding sections. The horses' day is past for this work.

Wenatchee Crop Big

THERE need be no fear of a short crop in the Wenatchee section. A survey just completed by District Horticultural Inspector Darlington and his staff indicates that by far the largest crop ever produced in north central Washington may be looked for, estimating a yield of 15,139 cars of winter apples and 1070 cars of soft fruit.

Comparing with former apple crops, it is found that 1920 produced only 9,358 cars and 1919, 12,358 cars. The soft fruit crop indicated for 1921 is: peaches, 250 cars; pears, 500 cars; apricots, 125 cars; cherries, 125 cars; plums and prunes, 70 cars.

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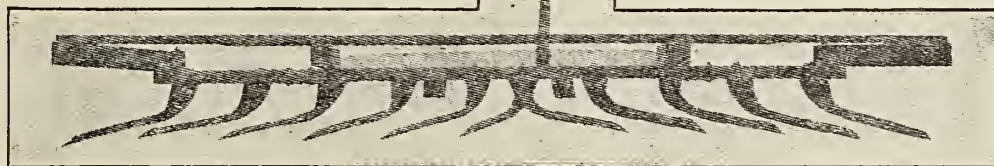
The KIMBALL CULTIVATOR—and a Perfect Mulch!

How to Use the Kimball to Keep Your Orchard in Perfect Condition

The first thing in the spring, as soon as the ground is dry enough it should be well plowed or disced both ways, or diagonal if the trees are planted in that manner.

The rest of the season nothing is needed but the KIMBALL, which should be run over the ground at least twice each month during the summer, or as soon as the ground is dry enough after a hard rain or after irrigation.

This will break up the crust and stop evaporation, for when the soil bakes and opens in cracks is the time of the greatest evaporation.



More cultivation and less irrigation will produce better fruit, and it will keep longer than where too much water is used.

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The Value of Spray Spreaders

THE use of the spreader in the poison spray solution which has come to be looked upon recently by expert horticulturists as very important to the orchardist is set forth in a valuable way to the fruit grower by Leroy Childs and A. L. Lovett in the crop pest report recently issued by the Oregon Agricultural College. In putting this phase of spraying before the orchardist these experts say:

"The use of a spreader in the poison spray solution accomplishes a number of desirable things. By increasing the wetting and covering power of the solution it permits a reduction in the amount of arsenic necessary for protection. By permitting a more uniform covering over the surface and increasing the adhesiveness, it affords a better protection from worms. Through the increased wetting and covering powers afforded, less solution is required to cover the trees and a tank of spray will go farther, finally allowing the spray to dry a smooth, even covering over the surface, an inconspicuous covering of the mature fruit is obtained. This does away with the blotchy, conspicuous poison coating so objectionable on the fruit when apples and pears are sent to eastern markets, particularly

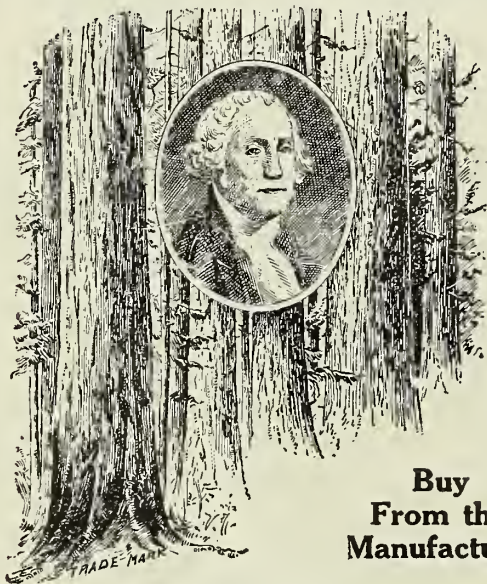
since there has developed a tendency to discriminate against the heavily sprayed Western fruit.

"The investigation of possible spreaders and their economic value in improving the efficiency of the spray solution under commercial orchard spraying conditions has been under way for four years. Many of the problems in connection with the investigation have not as yet been satisfactorily solved, but of the materials tested as spreaders for cheapness, availability, combatibility, efficiency and ease of preparation, casein, miscible oil, glue and proprietary soaps appear to be the most satisfactory.

"The casein used in the preparation of the spreader is the commercial powdered or granulated casein as derived from milk. The material may be purchased through the local druggist, or fruit unions may obtain it in quantities. In preparing it for use, make up a stock solution as follows: Casein, 20 ounces, sodium hydroxide, 3 ounces, water, 2½ gallons. Add the sodium hydroxide to the water and heat to the boiling point. While heating add the casein. Boil for ten minutes, replacing the water lost by evaporation. This forms the stock solution. For use stir

vigorously and remove one quart of the stock solution to add to each 100 gallons of spray. Where the casein is finely powdered a more simple method can be employed. This consists of four pounds of casein or parts by weight and twenty pounds of hydrated lime or parts by weight. These materials must be thoroughly mixed. Add the casein slowly to the lime (dry), while stirring vigorously. Pour the mixture from one container to another, repeating the operation until the materials are thoroughly mixed. Use one and one-half pounds of this stock mixture to 100 gallons of spray. The powder may be added directly to the spray tank. Pour the mixture slowly into the filled tank while the agitator is running. Start spraying at once or run the agitator for at least ten minutes to insure a complete solution of the spreader.

"**M**ISCIBLE oil emulsion appears to be one of the most efficient spreaders, although the adhesive qualities of the dried material are not equal to casein. The emulsion is easy to prepare, readily obtainable and not excessive in price. The lighter grades of miscible oil are probably advisable. No tests of the various brands have been made, although theoretically there should be nothing in favor of one over the other. In the tests made we used the



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General Chemical Company's Miscible Oil No. 2. One gallon of oil was used to each 100 gallons of spray. Do not attempt to pour the spray directly into the spray tank. First thoroughly mix the oil emulsion in the container. Remove the desired amount of oil and add slowly with vigorous stirring, twice the amount of water. The solution should become a milky white emulsion of uniform consistency throughout without any evidence of free oil or soapy flakes. The emulsion may then be added to the filled spray tank while the agitator is in motion. The tank of spray should be applied at once."

Glue and soap are also mentioned as available for use as spreaders although the investigators have not found them as desirable for this use as the materials above described.

Damage to Prune Trees by Peach Twig Borer

By W. H. Wicks

Director of Bureau of Plant Industry, Department of Agriculture, Boise, Idaho

INSPECTORS of the Bureau of Plant Industry, state department of agriculture, began reporting the activities of the peach twig borer in the Emmett valley and the Sunnyslope, Central Cove district of the Snake River district west of Caldwell, as early as the 15th of March this year. As the season advances its activities are noticed in later prune and peach growing sections, where this insect is becoming a serious pest. The majority of the larvae are found at this time still in their hibernating quarters, while some have already emerged and are devouring completely the center of buds. The larvae enters the bud either from the side or the terminal end of the bud, feeding downward. The economic loss due to this insect is represented by the large number of buds destroyed between now and blossoming time, causing a reduction of the crop and the killing or deforming of the twig growth.

Owing to the extremely small size of the larvae at the time it is damaging the buds and the difficulty in locating its hibernating quarters, much confusion has arisen in regard to the kind of insect which has been doing the damage to the buds and twigs, which damage is readily apparent to the fruit growers, but the cause of the damage being difficult to trace. During the past two years the department of agriculture has called attention to the presence of this pest and wishes at this time to again emphasize the necessity of all prune and peach growers searching carefully for this insect. The damage done by this pest is increasing, in fact, there are several orchards which are most severe-

ly damaged. A brief description of this insect will aid prune and peach growers to combat the same.

DESCRIPTION

THE adult is a dark gray-colored moth with four wings expanded about one-half inch and marked with darker spots (the adult is rarely seen).

The larvae is about 1-16 inch in length at time of hibernation in the fall and slightly larger at this date. It is the larvae which is destroying buds at this time and burrows down the twigs, usually entering the terminal bud. It is reddish brown with a blackish head and active. When full grown it will meas-



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ure almost one-half inch in length. The eggs are white to yellowish, elongate oval in shape. The moths of the last brood deposit eggs late in August and September in crevices and rough places in the bark. When the eggs hatch, usually in about five to seven days, the young larvae dig small cavities in the bark at the base of the new wood, usually at the crotch of the limb where the winter is passed. The hibernating quarters can be found upon close examination (high power lens usually required), as indicated by small reddish brown mounds of chewed bark, and in some cases may be webbed together by bits of web. As spring advances the larvae begins feeding on the surrounding tissues and reach the surface in from ten to fourteen days. The young larvae immediately attack the buds, destroying young fruit and burrowing down the pith of the tender shoots, causing them to wither and die as the season advances, thus necessitating the uninjured buds below to send out annual growth. The same larvae will destroy a large number of buds each season, also a number of twigs.

When full grown the larvae crawl to the larger branches or the trunk, where they construct very loose cocoons consisting of a few threads of silk. Here the pupae period lasts from ten to

twelve days. The moths emerge and deposit eggs on the new twigs near the base of the leaves. When the eggs hatch in probably ten days the larvae feed on the tips of the young shoots and attack the fruit and eat out a considerable cavity in the flesh which usually fills with gum. They sometimes eat in the seed and destroy the kernel. The second brood reaches maturity in July and August and pupate in the basin of the stem end of the fruit. The third brood moths deposit their eggs as a rule around the insertion of the stem. This brood of larvae usually feeds entirely on the fruit.

CONTROL MEASURES

USE LIME sulphur, winter strength, 5 degrees baume in tank 200 gallons, adding arsenate of lead paste No. 8, or arsenate of lead powder No. 4. The lime sulphur kills most of the hibernating larvae and the lead is designed for poisoning the remainder at their first feeding.

As damage is just now appearing in the warmer sections along the Snake river, prune and peach growers should lose no time in fighting this pest. Fortunately this spray will control San Jose scale and brown mite or so-called red spider. The arsenate of lead, however, is of no value for these two pests, but will do no harm.

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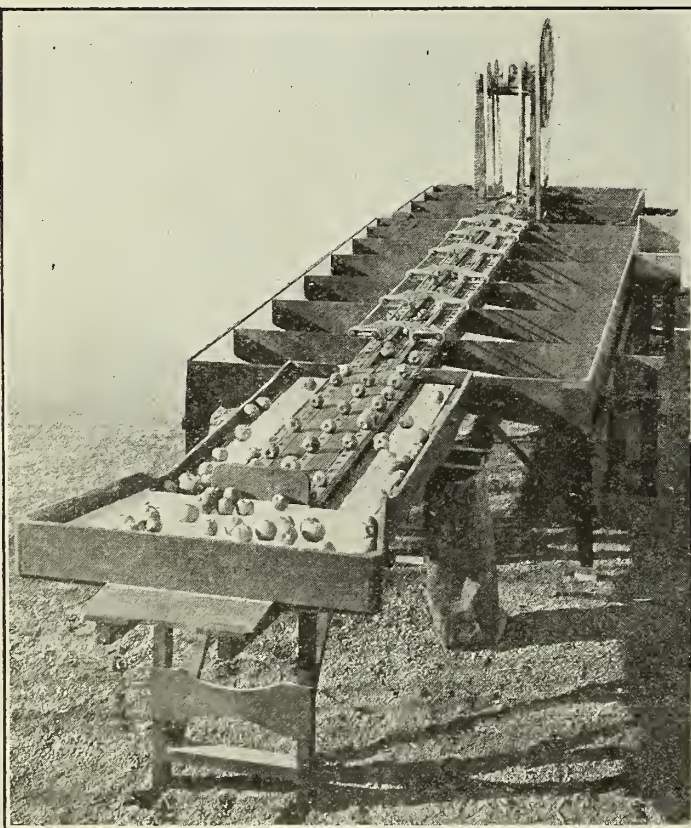
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Fruit Growing in Coos County, Oregon

By A. C. Chase

COOS COUNTY, Oregon, is exceptionally well adapted to growing berries of all kinds, vegetables and certain varieties of fruit. The first impression one gets on coming into Coos county is the luxuriant growth of vegetation, wild blackberries, evergreens, wild gooseberries, currants and raspberries growing in profusion along the waterways. This leads one to believe that Coos county must have climatic and soil conditions which are very favorable for berries and fruit, and in this presumption one is not mistaken. Small acreages of berries of various varieties have shown exceptional production and the quality has been the best.

Coos county has an average rainfall of fifty-four and a half inches, which is one of its principal assets. The soil is well watered and with good cultivation crops never suffer for the lack of moisture. The temperature rarely ever exceeds eighty-five degrees, which is a very favorable temperature for growing berries of all varieties.

The rich sandy soil along the Coquille river and its tributaries is especially well adapted to the production of raspberries, loganberries, blackcaps and Evergreens. Strawberries do exceedingly well on the upland and one grower last season netted \$1,400 from an acre and a quarter of New Oregons and this spring sold \$350.00 worth of plants.

Over two hundred acres of berries have been planted to date for the Holt-Chase Canning Company, Inc., who operate a fruit and vegetable cannery at Myrtle Point. Great interest is being manifested by the farmers of this district in the small fruit and berry industry, as they are aware that this locality is well adapted to this crop, thus making a more diversified operation in the farming activity of the county.

The section of the county around Myrtle Point, Bridge and Broadbent produce a fine Gravenstein apple. W. E. Hartley, who lives at Broadbent, a few miles south of Myrtle Point, was awarded the gold medal for his exhibit of Gravensteins at the Panama-Pacific International Exposition in 1915. Many other varieties of apples do well here, having good size, color and keeping qualities. Bartlett pears, walnuts and cherries do well and there is a large amount of hill land that is available for planting. Codling moth and San Jose scale are unknown and trees with practically no care as to spraying show a very small per cent of scab.

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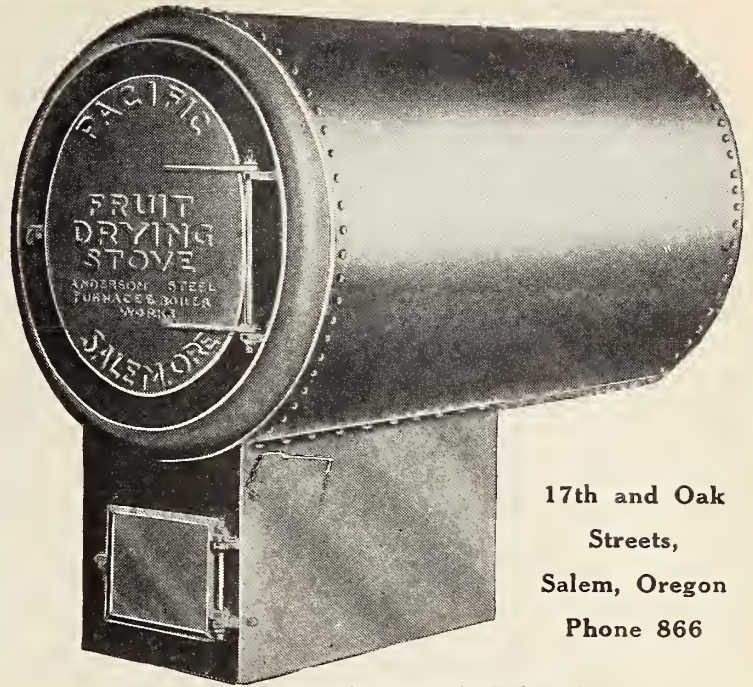
The following are a few
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H. C. Atwell, Forest Grove, 2.
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J. N. Latham, Vancouver, Wn., 1.
Dr. E. F. Hurtz, Vancouver, Wn., 1.
W. W. Silver, Newberg, 1.
A. L. Page, Jefferson, 1.
A. Bystrom, Monroe, 3.
Fred Ewing, Salem, 3.
Lee Herring, Lafayette, 1.
R. F. Davis, Oregon City, 3.
Clyde Burkhardt, Lebanon, 2.

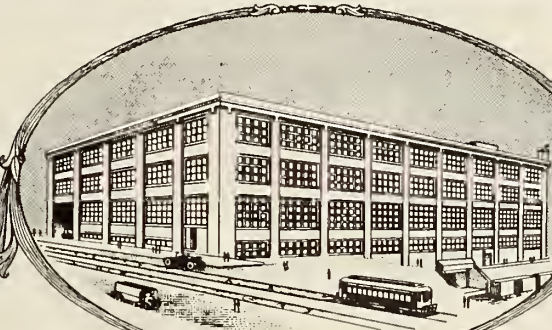
Dr. A. A. Starbuck, Dallas, 3.
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Northwest Evaporating Co., Cashmere, Wn., 2.
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Blasted Soil

IT IS generally conceded that trees or other crops in blasted soil grow faster and yield bigger crops because they develop bigger, deeper roots and get more water and more food than those grown on land prepared in the ordinary way.

This growth comes from four sources soil, air, sun and water. The difference between top-soil and sub-soil is only a difference in the stage of decomposition or disintegration of the mineral particles of which the soil is composed, and in the amount of remains of plants mixed with the mineral particles. Ground near the surface has been exposed to the action of heat and cold and water and plants and has been changed more than the ground under the surface.

The ground for several feet deep is usually composed largely of plant food. The reason plants cannot use it in this hard state is because it has never been entirely broken up. The agencies which transform the minerals into available plant food have not had a chance to act. Almost all soils contain enough potash and phosphorous to supply plant food for a long time if it can be made available. Chemists and plant pathologists state that plants consume about twenty

one different elements. All but four of these being used in very small quantities and being abundant everywhere. The greatest percentage of food of all trees and plants, however, consists of nitrogen, potash, phosphorous and water and these are the foods that most frequently have to be supplied.

Roots of the different trees and plants go to various depths depending on the condition of the soil. If the soil is properly broken up investigations have shown that grain plants will go down four to six feet, grasses five feet, alfalfa ten to fifteen feet, potatoes three feet, apple trees ten feet, peach trees eight feet and citrus fruit trees to a still greater depth. Within whatever depth of ground the roots occupy must be stored the necessary amount of water and plant food. If the soil is not in a condition to allow the plant roots to receive their amount of moisture and food, naturally they will not thrive or bear so well. The great benefit from blasting in planting trees or loosening orchard soil that has become hard is in the response of the greater amount of water and food in the soil that almost immediately takes place. Once broken up with proper tillage the fertility of the soil can be maintained and kept in the best condition for maximum crop production.

Strawberry Flowers

STRAWBERRIES produce two types of flowers, imperfect, or pistillate and perfect, or staminate. Imperfect or pistillate flowers contain pistils, but not stamens, while perfect or staminate flowers contain both pistils and stamens. Pollen, which is produced in the stamens is essential to the setting of fruit. A variety with perfect flowers, therefore, can produce fruit when planted by itself, but one with imperfect flowers can not set fruit unless perfect flowering plants are near to furnish pollen through the agency of bees or other insects. Because of this, varieties having imperfect flowers are not as desirable as those having perfect flowers, and fewer of them are grown. However, some of the sorts having imperfect flowers or "imperfect varieties," as they are commonly called, are very productive and are liked in certain sections. Imperfect varieties also are injured less by the strawberry weevil than perfect sorts, since this insect feeds on pollen, and in regions where it is serious, imperfect sorts are often grown in relatively large proportions. However, they form less than 5 per cent of the total acreage devoted to strawberries in the United States and their planting appears to be decreasing.

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VANCOUVER—The Royal Mail Steam Packet Co., Pacific Bldg. Phone—Seymour 7108.

the usual practice in planting is to set one row of a perfect variety for every two or three rows of imperfect ones.

There are certain varieties of strawberries that under ordinary conditions produce flowers having both stamens and pistils, but frequently, under peculiar weather conditions they produce so few stamens that they do not have sufficient pollen to insure the setting of fruit. A variety producing an abundance of pollen should be planted with such varieties in the proportion that perfect varieties are usually planted with imperfect ones.

According to a recent report of the United States Bureau of Crop Estimates, the commercial acreage of strawberries in the United States for 1921 will show a considerable increase over that of the preceding year. It is estimated that the acreage in strawberries this year will be 57,219 acres as compared to 48,619 acres in 1920, giving an increase of 8,600 acres.

Orchard cultivation should start with a rush now. Clear, sunny days causes the ground to dry rapidly. It often pays to hire extra teams or a tractor in order to plow just at the right time so subsequent cultivation will be cheaper. —O. A. C. Experiment Station.

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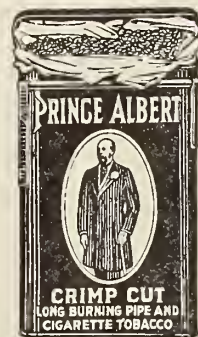
Do it while the going's good! Such flavor, such coolness, such more-ish-ness—well, the only way to get the words emphatic enough is to go to it and know yourself!

And, besides Prince Albert's delightfulness, there's its freedom from bite and parch which is cut out by our exclusive patented process! Certainly—you smoke P. A. without a comeback. Joy'us? You'll say so!

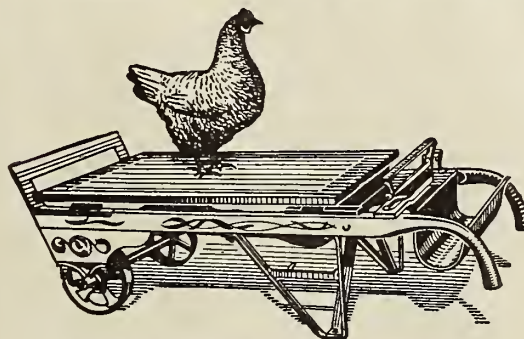
Prince Albert is the tobacco that revolutionized pipe smoking. If you never could smoke a pipe—forget it! You can—AND YOU WILL—if you use P. A. for packing!

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Paulus Heads Oregon Association

R. C. PAULUS, prominent in fruit circles of the northwest and sales manager of the Oregon Growers' Co-operative association since its organization in August, 1919, was elected general manager of the association and Oregon Packing Corporation at the annual meeting of directors and executive committee of the association.

C. I. Lewis, former manager of the organization department, was made assistant general manager. All the management of the association will now be centered at the Salem office.

Mr. Paulus, until the association was organized, was manager of the Salem Fruit Union. He has held positions of trust in a number of the large horticultural associations in the west and northwest.

Mr. Lewis was for 14 years head of horticulture at the Oregon Agricultural College and is a recognized authority on all matters pertaining to horticulture.

The Oregon Growers' Co-operative Association, during the past year, has shipped about 1,500 cars of fruits and vegetables, according to the report of the sales department, submitted at the annual meeting.

Of the 12,000,000 pounds of prunes delivered to plants of the association, all had been sold up to April 26, excepting 3,077,043 pounds. Eighty markets were developed for Oregon prunes, forty of these buying in car lots or more. The state of New York was the heaviest purchaser, receiving 1,940,015 pounds. England bought 861,550 pounds in direct shipments from Oregon plants.

Of loganberries, the association sold 1,072,956 pounds at an average price of 12.7 cents. Of cherries there were sold 1,014,955 pounds, also at an average of 12.7 cents. Other average prices were: Gooseberries, 7.9 cents; raspberries, 20 cents; strawberries, 16.9 cents; currants, 10 cents; evergreen blackberries, 7 cents; green prunes, 4.4 cents.

Of the 210,930 boxes of apples shipped by the association, England was the heaviest buyer, receiving direct shipments of 86 car lots. Apples were sold in 35 markets with New York City taking 59 cars, Los Angeles, 44 cars, Chicago, 35 cars, Baltimore, 15 cars and Memphis, 10 cars.

A total of 5,555,953, pounds of pears were sold the past season to 59 markets. Of the 402 cars shipped, New York City took 123 cars; Havana, 11 cars; Canada, 10 cars; London, 12 cars. From the Rogue River valley, with Medford and Grants Pass as shipping points, were shipped 4,575,095 pounds.

The association handled 85 per cent of car lot shipments of broccoli out of Oregon. There was a total of 27,514 crates.

The Oregon Growers' Co-operative association was organized at Salem, Oregon, August 1, 1919, with 137 members, controlling 3,000 acres of fruits and berries. The membership now is 1648, controlling 28,838 acres.

While the Oregon Growers' Co-operative association shipped 50 varieties of apples last season, Mr. Lewis says that for the benefit of the apple industry, there really should be grown only about ten varieties.

These ten varieties, he says, are: Spitzenburg, Newtowns, Ortleys, Rome, Grimes, Winter Bananas, Delicious, Jonathans, Gravensteins and Wagner. It would be better, he contends, if this list was cut down to the first six varieties names.

What They are Doing in California

COUNTY Horticultural Commissioner L. O. Haupt, of Hanford, in a recent report says: "The planting season has closed showing a heavy planting of trees and vines, especially the latter. Shortage and high price of vines curtailed the planting somewhat. The following were inspected and planted besides stock grown by the growers themselves, which was not inspected:

Apricots	25,956
Peaches	33,141
Prunes	22,777
Miscellaneous (trees)	5,286
Grapevines (rooted)	1,189,652

"The Tilton was the principal variety of apricots planted; Lovells lead in the peach varieties, while prunes were limited to the French variety almost entirely. About half of the vines were Thompson Seedless, as this variety was the only one that could be secured at reasonable prices."

EIGHT Japanese strawberry growers from various parts of the state are in the Oakland city jail charged with violating the standard packing laws of the state. D. P. T. McDonald, deputy horticultural commissioner, of Alameda county, swore to the warrants. The Japanese were traced through boxes of strawberries placed on the Oakland wholesale markets. These boxes, it is alleged, were packed with a top row of fine ripe berries, while the bottom rows were composed of overripe and diseased berries.

SAN FRANCISCO has received its first car of Mexican watermelons. Owing to the strict regulations pertaining to the introduction of Mexican fruit flies, a rigid inspection of the shipment was conducted by quarantine inspectors of the state department of agriculture.

CANNERY NOTES

THE canning situation is very uncertain, according to R. C. Paulus, general manager of the Oregon Growers' Co-operative Association. Canneries have no orders for future delivery and hence have no means of knowing how much to can or how much they can pay growers for fruit and berries. Wholesale houses are not placing heavy future orders, buying on a hand to mouth basis. If this continues, Mr. Paulus says that the trade will be out of canned goods before another season and in the meantime considerable portions of fruit will have spoiled. Cannerymen and growers are giving much thought to the canning proposition, Mr. Paulus says, and that some plan may be worked out, although at present it is difficult to say just what this plan will be.

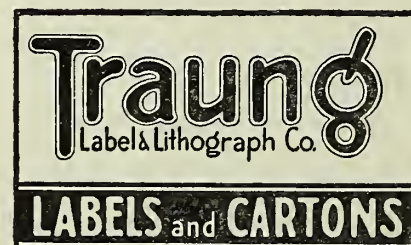
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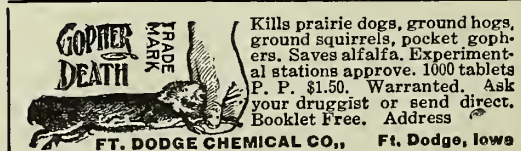


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ARTICLES on incorporation have been filed by the Silverton Producers' Canning Company, which is capitalized at \$100,000. The incorporators are Fred Uphoff, J. R. Mero and M. E. Lee.

Northwest Fruit Notes From Here and There

WASHINGTON

A VOLUNTARY petition in bankruptcy has been filed in the U. S. District Court in Spokane by the Bohlke Fruit Company through N. M. Sorenson, its attorney. Accompanying the petition was a schedule showing liabilities amounting to \$1,309,248 and assets of \$847,471. With this petition was filed another from the creditor's committee, named some time ago through Attorney D. A. Shiner, asking that William A. Doelle of Cashmere be named temporary receiver to take charge of the company's affairs until a permanent trustee is appointed. This action comes as a culmination of the investigation into the affairs of the company instituted by creditors when they took over the Bohlke affairs April 2.

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CAR LOT shipments from the northwest, by districts, from July 1, 1920, to March 1, 1921, were as follows:

Wenatchee valley, 1862; Yakima valley, 7659; Spokane district, 2764; Southern Idaho, 2244; Hood River, 2166; Walla Walla district, 433; Montana, 436; Rogue River district, 369; Western Oregon, 263; Eastern Oregon, 266.

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ESTIMATES of Yakima Valley's fruit crop, based on inspections made after the late frosts, show little change from that announced four weeks ago by H. A. Glen, general agent of the Northern Pacific, at Yakima, whose crop predictions have generally proved reliable. Mr. Glen estimates: Apples, 12,500 cars; pears, 2500 cars; peaches, 1200; plums and prunes, 140; cherries, 259; melons, 400; total, 16,990 cars. His figures include Yakima and Benton counties, but not Kittitas county, which produces little fruit.

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THE Wenatchee District Co-operative association, recently perfected, has signed up 4250 cars of apples in the Wenatchee valley, according to C. A. Campbell, cashier of the Citizens' State Bank of Leavenworth. The new organization has completed a selling arrangement with the North American Fruit Exchange, which will open an office in Wenatchee.

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ABOUT 250 acres have been planted to berries in the Aberdeen section this spring. While these will not bear this year, a large acreage planted last year will come into bearing.

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CAREFUL examination of many orchards in the Wenatchee section shows there is no foundation for pessimistic reports. There has been a heavy dropping of blossoms and embryonic fruit, but there are still enough apples left on the trees to insure a record breaking crop, according to all authorities. The extraordinary heavy bloom made it necessary for 75 per cent to fall off or else be pulled off in thinning. Prospects still indicate a bumper crop of cherries, apricots, peaches, pears and apples, despite the drop.

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TWENTY-FIVE thousand boxes of Yakima apples, shipped from Seattle the last week in March, arrived in England on May 4 in perfect condition, according to a cablegram. The message quotes the market at "from 16 shillings to 17 shillings, six pence a box." Australian Jonathans, now reaching the English market, are selling for 28 shillings or \$3.30 a box, for extra fancy at present exchange rates.

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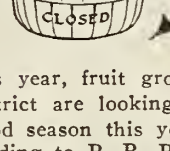
THE first crate of strawberries to be ripened this spring in the Prosser section of the Yakima valley was brought in by J. Harkema and won the prize given annually by the commercial club.

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PS. DARLINGTON, district horticultural inspector in Okanogan county, north of Spokane, states that the late frosts have done no damage to fruit in the Okanogan valley, and judging from a wealth of bloom the apple crop this fall promises to be very heavy.

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WITH the prospective apple crops in other sections damaged by early frosts, thereby making the demand for northwest apples greater



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this year, fruit growers throughout the Spokane district are looking forward with optimism to a good season this year in spite of low prices, according to P. R. Parks, manager of the Spokane Fruit Growers' Company.

"Prospects now look very favorable," Mr. Parks said. "While a late frost is always to be considered we always consider the crop fairly safe after May 20, so that chances for damage this year are slight."

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THE contract for the construction of a two-story packing house with an air cooled storage capacity of 40,000 boxes, to be built on the six-acre tract of the Winthrop Fruit Company at Glee, Wash., has been let to Kelley & Sons of Selah.

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IDAHO

NOW that the "big freeze" is over and the fruitgrowers of the Payette valley are able to take stock of the damage done to their crops, it is manifest that the damage done is not nearly as heavy as was at first feared.

Orchardists and shippers alike estimate that the 1921 apple crop will be the largest harvested in the valley for some years. Pears also look promising, although the earlier varieties have been somewhat damaged. Sweet cherries have suffered, though they are by no means all gone, and the sour cherries promise well. Peaches and apricots suffered more than any other variety of fruit, but as there are comparatively few of them in the Payette valley this does not mean a big loss.

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PRESENT indications are that Idaho will have a normal commercial crop of apples and prunes, a very light crop of cherries, and practically no peaches or apricots, according to W. H. Wicks, director of the Bureau of Plant Industry, Boise. In the northern counties, particularly in Boundary, the peach trees were nearly all killed by winter injury. The outlook is very promising for Bonner, Kootenai and Latah counties. At Lewiston on account of rainy weather during the blooming period an exceedingly heavy drop of cherry blossoms was occasioned from the lack of proper pollination. In the Weiser district, most varieties of the apple show only a small number of blossoms killed, which still leaves more apples than can develop. The Delicious and White Winter Pearmain seem to have suffered the most. In the Roswell, Panama and Apple alley section, peaches, apricots and early varieties of the apple are practically a total loss.

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With the Poultry

LATE HATCHED CHICKS

LATE hatched chicks are usually something of a problem to the poultry raiser. These chicks may be made profitable if they are cared for separately and not allowed to run with the other chicks. If but one yard is available, make a feeding coop for the baby chicks into which the older chicks cannot stick their heads. The danger to the late hatched chicks from the older chicks mainly comes from two reasons. They may stunt the late hatched chicks by robbing them of their food, or they may give them chicken lice.

A mistake sometimes made with late hatched chicks is to try to raise them out of doors without heat. No matter what the season young chicks need to be kept warm, especially at night. The temperature of the hover should not be less than 90 even in July. This heat must be available to them until they are feathered.

TREATING GAPES

IT IS during the early summer that most of the trouble is experienced by poultrymen with gapies in chickens. This trouble is caused by worms in the windpipe of the affected fowls. The larva of this parasite is picked up by the chickens in the damp earth which attach themselves to the windpipes of the fowls, where they first cause irritation and later as they grow and develop obstruct the air passages.

Treatment for chickens affected with gapies is to place them in a pen or room which has been sprinkled freely with slaked lime. A few drops of turpentine added to the rations is often beneficial in controlling the disease. Methods used to dislodge the worms are to use a feather dipped in turpentine and passed down the chicken's windpipe or pulling them out with a twisted horse hair. Instruments for this purpose can also be secured at poultry supply houses.

Prevention methods are to lime the soil where gapies infected chickens have run; keeping them from running under outbuildings or in damp places. Chickens badly infected with gapies should be killed while those unaffected should be confined in a yard freely sprinkled with a liberal amount of freshly slaked lime.

POULTRY NOTES

FEED for poultry should never be allowed to become sour or fermented. It should be kept fresh and wholesome.

KEEPING a strict account of both the expense and proceeds of fowls is the only way to know if they are paying. This requires but little time, but it is a very important item in successful poultry keeping.

A GOOD way to prevent drinking vessels and feed troughs from developing disease germs is to scald them out with hot water every few days.

IN BREAKING up broody hens do not use harsh methods. Broodiness is nature's provision for rest and the measures adopted for overcoming it should be along intelligent lines.

AS WARM weather comes on is the time to keep a close watch for vermin. Remember that whitewash and kerosene are cheap and effective, so don't be afraid of using it too frequently.

KEEP the young pullets vigorous and growing without pushing them too fast, for on them depends the future supply of eggs.

GRAIN is a necessity in the feed of every well developed poultry flock. Bran, sloppy feeds and allowing the flock to range will not keep it in the proper condition either to produce eggs or to be marketed unless grain is fed.

AN indication of head lice on young chickens is when they become dopey, hank their wings and sprawl on the floor unable to walk. When this condition is noticed they should be given immediate attention. A good preventive is to grease their heads at least once a week.

THE orchard affords an ideal ranging place for poultry. They devour innumerable enemies of fruit trees as well as getting plenty of exercise in scratching up the ground in search of bugs and worms. The orchard also provides them with shade during the hot days.

REMOVE the male birds from the flock as soon as the hatching season is over so as to produce infertile eggs. Infertile eggs keep much better than those that are fertile in addition to the fact that the male bird has no influence on the number of eggs laid.

THE hen's greatest profit producing time is the first and second years. For this reason she should receive the greatest care and attention during this period.

BRIEF rules for the poultryman who desires to raise his egg standards are as follows: 1. Keep the nests clean; provide one nest for every four hens. 2. Gather the eggs twice daily. 3. Keep the eggs in a cool, dry room or cellar. 4. Market the eggs at least twice a week. 5. Sell, kill or confine all male birds as soon as the hatching season is over.

What Papers Interested in Fruit Are Saying

AT any rate there is something radically wrong with the railroads. For instance, cabbage growers in the Rio Grande Valley of Texas receive \$6 a ton for their product. The freight and icing charges to Houston and Dallas amount to practically \$15 per ton, or two and a half times the original cost of the product. The rate to Kansas City is more than \$31 per ton, or better than five times the amount the grower receives. You can figure it out for yourself; we're in a hurry to go to the circus.—New York Fruit Trade Journal.

SOME people cannot seem to get it out of their heads that they can break the Oregon Growers' Co-operative Association, and that it is legitimate to resort to almost any means to accomplish this end. They believe that if the Oregon growers can be done away with, that the growers will be at their mercy, and they need not worry very much about what the growers think of them.

Recently we have been told on pretty good authority that one concern has stated they were willing to spend \$100,000 to break our organization. These insidious attacks do not worry us very much because they always prove to be boomerangs, and hurt more the men who inaugurate the move, than they do the organization.

We are making friends every day. We are growing every day. We hope we will always be classed as an organization with vision, with breadth and that we will be charitable in our ideas towards others. That we will build ourselves, not by tearing others down, but by putting across a good, constructive program to upbuild Oregon.—The Oregon Grower.

THE railroads are great at issuing permits to farmers to "gather drift wood on the shares." They will encourage production of 50 cars of watermelons, cabbage or onions where only one car of corn or cotton grew before. But, when the time of shipping comes the railroads are just as apt as not to demand freight in advance and at rates that are as high or higher than the product will sell for at destination. Thus after the driftwood is gathered the roads take both their own and the farmer's share. But, the farmer is expected to be tickled because he has had a job.—The Packer.

TO DATE a total of 9870 motor trucks have been registered in Oregon. The lighter trucks prevail with those under one ton and from one to one and one-half-ton capacity leading by many hundreds above all others. Around 2000 trucks range from two tons to five tons capacity.

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O. A. C. NOTES

Cland as soon after plowing as possible, reports the soils department. When it is applied early the rains carry it into the soil, dissolving it and making it available for the plants. Many instances have been found where fertilizer was purchased and left in the barn through the entire season. Experiments have proved that late applications, though better than none at all, do not bring the returns that early applications do.

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SEED grades and regulations of Idaho will be explained at O. A. C., June 13-18, by B. F. Sheehan, state seed commissioner for Idaho. The Oregon seed regulations will be gone into by C. W. Hawley, state dairy and food commissioner and member of the college board of regents. In view of the fact that considerable seed of certain kinds crosses the Oregon-Idaho borders the seed laws for home sales and inter-state shipments are regarded as important marketing factors. These two men are high authorities on these matters in their respective states.

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GOOSEBERRY leaf spot or anthracnose is very troublesome this season in western Oregon. The bushes should be sprayed with lime sulphur (1 to 35) which controls mildew also. Immediately after harvesting the bushes should be sprayed with bordeaux 4-4-50.

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MUCH defoliation may be expected this season from cherry and prune leafspot, where this disease is known to occur, unless the trees are sprayed now with bordeaux (4-4-50). This disease is caused by cylindrosporium. The trees should be sprayed now and again in a month. The disease attacks the leaf stems causing the leaves to turn yellow and fall and also the stems of the cherries causing the cherries to shrivel. This bordeaux spray will also aid in the control of brown rot.

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"PROSPECTS for good crops of small fruits, especially are excellent in the region of Dallas, Sheridan, Dilley, McMinnville, Forest Grove, Newberg, Dundee and Salem," says W. S. Brown, chief of horticulture at O. A. C. "The prune crop evidently will be small, due to the dropping of the young fruits. Apple and pear crops are of excellent size and quality."

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OREGON GROWERS' ASSOCIATION NOTES

THE Oregon Growers' Co-operative Association has advanced its prices on prunes, according to an announcement made by R. C. Paulus, general manager.

The association is now getting nine cents a pound for prunes, 40-50 size, packed in 25-pound boxes, f. o. b. the coast and in some instances a better price. Efforts are being made by the association to strengthen the price on smaller sizes of about one cent a pound.

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ALTHOUGH it is a little early to form a definite estimate of the prune crop, reports coming to the association from all prune districts indicate considerable loss, especially in the hill orchards. These blossomed a little later than the lower lands and were caught in the rain and cold weather during blossoming period.

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FARMS FOR SALE

WANTED—To hear from owner of good ranch for sale. State cash price, full particulars. D. F. Bush, Minneapolis, Minn.

WANT to hear from parties having farm for sale. Give particulars and lowest price. John J. Black, 197th St., Chippewa Falls, Wisconsin.

EXCEPTIONAL ORCHARD BARGAIN—50 acres fine bearing apple orchard, best varieties, in good district; has had best care and attention and is in excellent condition; attractive buildings with running water in them; fully stocked and equipped for operating; should produce 6000 packed boxes this year. Offers for \$18,000; \$5000 down, balance can be paid out of crop. Luddemann Co., 913 Chamber of Commerce Bldg., Portland, Oregon.

CALIFORNIA FARMS near Sacramento for sale. Write E. R. Waite, Shawnee, Oklahoma.

LOGGED-OFF LAND in Stevens County, Washington, at greatly reduced prices: Why bother with fruit land at high prices when you can get good dairy and stock land at from \$5.00 to \$20.00 per acre? Write for folder. Phoenix Lumber Co., Dept. B, Spokane, Wash.

POULTRY

BABY CHICKS—"Only the best." May and June delivery. White and Brown Leghorns, R. I. Reds, Barred Rocks. Safe arrival guaranteed. All vigorous chicks from good layers. Send for circular. Stubbe Poultry Ranch and Hatchery, P. O. Box 67-L, Palo Alto, Cal.

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MEN with proven ability capable of selling a line of high grade nursery stock on a commission contract. Weekly cash advance. Splendid territory may be had by answering immediately. SALEM NURSERY CO.
427 Oregon Building Salem, Oregon

AGENTS WANTED—Benedict Nursery Co., 185 East 87th St., Portland, Oregon.

MISCELLANEOUS

THE CUTLER FRUIT GRADER is the LEADER. Nearly 1,000 now in use. The market demands well-sized fruit. Use a CUTLER GRADER and better your pack. Built for both box and barrel packing—in small and large models. Send for literature. Cutler Mfg. Co., 353 E. 10th St., Portland, Oregon.

ARROW CARBOLINEUM kills chicken mites in poultry houses. Preserves wood against rot and premature decay. Write for circular and prices. Carbolineum Wood Preserving Co., 222 E. Water St., Portland, Oregon.

TOBACCO—KENTUCKY NATURAL LEAF, chewing and smoking; rich, ripe and mellow; two and three years old, aged in wood; 2 lbs., \$1; 7 lbs., \$3; sample 10 cents. Maddox Bros., Dept. 22, Mayfield, Ky.

TOBACCO—Kentucky's Natural Leaf Smoking or Chewing; mild or strong; aged in wood; rich and sweet; 5 lbs., \$2; second grade, 10 lbs., \$2.75. Postpaid. Waldrop Bros., Murray Ky.

IDAHO CLOVER HONEY, 10c POUND—Two 60-lb. cans, \$12; 60 lbs., \$6.25; charges collect. 10 lbs., prepaid, \$2.50; rich, thick, light color, delightful flavor. Browne, Box 499, Twin Falls, Idaho.

HERE'S A REAL BARGAIN while they last: U. S. army tents, 9x9, 12-ounce at \$10.00. These tents make the best of housing for your pickers. They are cheap at this pre-war price. Also have some more of our famous tent flies—ideal for wagon covers to protect your fruit when hauling, 10x15, \$7.50. Alaska Junk Co., 203 Front St., Portland, Oregon.

BOOKKEEPER—Learn complete elementary bookkeeping in your spare time at home. Makes income tax reports easy. Only \$37.50. Write for terms. The Lincoln Institute, Spokane, Wash.

Statement of Ownership

STATEMENT of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of the Better Fruit, published monthly at Portland, Oregon, for April 1, 1921.

State of Oregon, County of Multnomah—Before me, a notary public in and for the state and county aforesaid, personally appeared C. J. Owen, who, having been duly sworn according to law, deposes and says that he is the business manager of Better Fruit, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher, Better Fruit Publishing Company, Inc., 281 12th St., Portland, Oregon. Editor, W. H. Walton, 281 12th St., Portland, Oregon. Managing Editor, None. Business Manager, C. J. Owen, 281 12th St., Portland, Oregon.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock).

Owner, Better Fruit Publishing Company, Inc., Portland, Oregon. Stockholders, Jerrold Owen, 281 12th St., Portland, Oregon; D. L. Carpenter, 800 Oregonian Bldg., Portland, Oregon; E. E. Faville, 800 Oregonian Bldg., Portland, Oregon; A. W. Stypes, 800 Oregonian Bldg., Portland, Oregon.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages or other securities are: (If there are none, so state). None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner, and this affiant has no reason to believe that any other person, association or corporation has any interest, direct

or indirect, in the said stock, bonds or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (The information is required from daily publications only.)

C. J. OWEN,
Business Manager.

Sworn to and subscribed before me this first day of April, 1921.
(SEAL)

GEORGE H. CARR,
Notary Public for Oregon.
(My commission expires April 29, 1925.)

The Friend Mfg. Co. of Gasport, New York, who make the Friend Spray Mixing Machine, report that they received FORTY-TWO inquiries from the one display advertisement they have thus far run in BETTER FRUIT this season.

Gebhardt, Scudder & Hendrickson

Attorneys at Law

610 Spalding Building, Portland, Oregon

Attorneys for Better Fruit Publishing Co.

TREES AND SHRUBS



Fruit trees budded from bearing orchards. Apple, Pear, Cherry, Peach, Plum, Prune, Apricot, Quince, Grape Vines, Shrubbery, Plants, Raspberries, Blackberries, Logans, Dewberries, Asparagus, Rhubarb, Flowering Shrubs, Roses, Vines, Hedge, Nut and Shade Trees. Carriage paid. Satisfaction guaranteed.

WASHINGTON NURSERY CO.

Toppenish, Washington.

Salesmen everywhere. More wanted.

Good roads and good Gasoline

That is the combination that brings a smile to the motorist.

You can be sure of good gasoline where you see the Red Crown sign. Red Crown is "the gasoline of quality"—the all-refinery gasoline with power in every drop.

Look for the Red Crown sign on service stations and garages.

STANDARD OIL COMPANY
(California)

The Gasoline
of Quality



WHEN WRITING ADVERTISERS MENTION BETTER FRUIT

A Time Saver on the Farm

INTERNATIONAL Motor Trucks are big time savers on the farm.

One farmer living ten miles from town makes the round trip with an International in less than three hours. It used to take a whole day with horses.

There are fewer chores than when horses do the hauling. The sturdy, reliable International requires little attention. Unsurpassed International service prevents delays and assures low cost operation. This saving in time alone makes the International

truck more than worth its cost on the farm.

The four-cylinder block-cast, valve-in-head engine has abundant power and sturdiness to meet all farm hauling demands. Every part measures up to the rigid standard of quality set by International engineers. Capacities range from 1,500 to 10,000 pounds. Body types include grain-tight boxes, stock racks, hay racks and other styles.

Let the nearest International Motor Truck dealer show you why International trucks increase farm profits.

INTERNATIONAL HARVESTER COMPANY

CHICAGO

OF AMERICA
(INCORPORATED)

U S A

92 Branch Houses and 15,000 Dealers in the United States



THE WORLD-
OUR ORCHARD

STEINHARDT & KELLY NEW YORK

UNQUESTIONABLY THE
MOST IMPORTANT FACTOR
IN THE DISTRIBUTION OF
THE COUNTRY'S FANCY
APPLES
AND OTHER FRUITS

OUR MARKET-
THE WORLD



